CLAIMS

What is claimed is:

1. A method of establishing a route for a data packet in a point-to-point network, said point-to-point network connected to a shared medium network and having a plurality of nodes including at least one network access point, comprising:

broadcasting a route request from a source node to a destination node in said point-to-point network and unicasting a route reply from said destination node to said source node in said point-to-point network;

establishing a route entry for said source node in each intermediate node receiving said route request and establishing a route entry for said destination node in each intermediate node receiving said route reply; and

including a next hop node indicator in each route entry, said next hop node indicator indicating said shared medium network if a next hop node is located within said shared medium network.

2. The method according to claim 1, wherein said route request is an Address Resolution Protocol (ARP) request generated in a higher layer of said source node, and said route reply is an ARP reply generated in a higher layer of said destination node.

3. The method according to claim 2, further comprising obtaining an IP address of said source node from said ARP request and obtaining an IP address of said destination node from said ARP reply.

4. The method according to claim 3, wherein said IP address of said source node and said IP address of said destination node are obtained by snooping said higher layers of said source node and said destination node, respectively, as said ARP request and said ARP reply are sent down from said higher layers.

5. The method according to claim 2, wherein said IP address of said source node and said IP address of said destination node are obtained from an ARP cache of said source node and said destination node, respectively.

6. The method according to claim 2, wherein an IP address of any node in said point-to-point network may be obtained from an IP header of an IP packet sent by said node.

7. The method according to claim 2, wherein an IP address of any node in said point-to-point network may be obtained from a Dynamic Host Configuration Protocol message assigning said IP address to said node.

8. The method according to claim 2, wherein said ARP reply contains a link local IP address.

9. The method according to claim 8, further comprising extracting a MAC address of said source node from said ARP reply, replacing a destination MAC address of said ARP reply with said MAC address of said source node, and unicasting said ARP reply without attaching said ARP reply to a non-ARP route reply.

10. The method according to claim 8, further comprising extracting a MAC address of said source node from said ARP reply, replacing a destination MAC address of said ARP reply with said MAC address of said source node, and unicasting said ARP reply attached to a non-ARP route reply.

11. The method according to claim 10, further comprising broadcasting said ARP reply without attaching it to said non-ARP route reply after unicasting said ARP reply attached to said non-ARP route reply.

12. The method according to claim 11, wherein said ARP reply is broadcast using a data packet having a broadcast type that is the same as a broadcast type of a data packet used to broadcast said ARP request.

13. The method according to claim 2, further comprising detecting a break in a route between two nodes and removing, from a node detecting said break, any route entries that are affected by said break.

14. The method according to claim 13, further comprising defining a dependent neighbors table in said detecting node for each route entry affected by said break, and sending a route failure indication message to each node in said dependent neighbors table.

15. The method according to claim 14, wherein said nodes in said dependent neighbors table are upstream nodes that depend on said detecting node to provide a next hop in any route.

16. The method according to claim 1, wherein said route is to be established via both said point-to-point network and said shared medium network and via two network access points, further comprising including a source node hop distance, which is a hop count between said source node and a network access point of said source node, in said route request, and including a destination node hop distance, which is a hop count between said destination node and a network access point of said destination node, in said route reply.

17. The method according to claim 16, further comprising adding said source node hop distance to a hop count in said route request received from one of said network access points at said destination node, and adding said destination node hop distance to a hop count in said route reply received from another one of said network access points at said source node.

18. The method according to claim 17, wherein said source node and destination node hop distances are contained in an indicator field in said route request or said route reply that also indicates a status of a node originating said route request or said route reply, or a status of said route request or said route reply itself.

19. The method according to claim 18, wherein said indicator field includes a "node status unknown" indicator, indicating that said node originating said route request or route reply has lost contact with its most recent network access point.

20. The method according to claim 18, wherein said indicator field includes a "message forwarded by network access point" indicator, further comprising determining in a destination/source node receiving said route request/reply whether said source/destination node hop distance is already stored in said destination/source node, and if yes, adding a source/destination node hop distance in said route request/reply to a destination/source node hop distance of said destination/source node receiving said route request/reply to obtain a hop count of said route through said shared medium network, and comparing said hop count of said route through said shared medium network with a hop count of said route through said point-to-point network.

21. The method according to claim 20, wherein upon determining that said source/destination node hop distance was not already stored in said destination/source node, further determining in said destination/source node whether a previous route entry for said originating node exists in said destination/source node, and if yes, comparing a hop count in said route request/reply with a hop count of said previous route entry, and keeping said previous route entry or generating a new route entry based on said comparison.

22. The method according to claim 21, wherein said new route entry is generated based on said comparison, further comprising indicating said hop count of said new route entry is possibly underestimated.

23. The method according to claim 22, wherein a route request/reply with a source/destination node hop distance is subsequently received at said destination/source node, further comprising adding said source/destination node hop distance of said subsequently received route request/reply to said possibly underestimated hop count said new route entry to obtain an updated route entry, and keeping either said updated route entry or a route entry of said subsequently received route request/reply based on a respective hop count thereof.

24. The method according to claim 1, further comprising sending a dummy shared medium network data packet from one of said network access points to notify other ones of said network access points of a new node joining a service area of said one of said network access points, wherein said dummy shared medium network data packet contains a MAC address of said new node as a source MAC address, and wherein said dummy shared medium network data packet is discarded by all nodes on said shared medium network except said network access points.

25. The method according to claim 24, wherein a payload of said dummy shared medium network data packet is an ARP request with all address fields set to zero.

26. A system for establishing a route for a data packet in a point-to-point network, said point-to-point network connected to a shared medium network, comprising:

a source node configured to broadcast a route request to a destination node, said destination node configured to receive said route request and to unicast a route reply to said source node to establish a route therebetween;

an intermediate node configured to establish a route entry for said source node upon receipt of said route request, and establish a route entry for said destination node upon receipt of said route reply; and

a next hop node indicator in each of said route entry, said next hop node indicator indicating said shared medium network if a next hop node is located within said shared medium network.

27. The system according to claim 26, wherein said route request is an Address Resolution Protocol (ARP) request generated in a higher layer of said source node, and said route reply is an ARP reply generated in a higher layer of said destination node.

28. The system according to claim 27, wherein said source node is configured to obtain an IP address thereof from said ARP request, and said destination node is configured to obtain an IP address thereof from said ARP reply.

29. The system according to claim 28, wherein said IP address of said source node and said IP address of said destination node are obtained by snoop said higher layers of said source node and said destination node, respectively, as said ARP request and said ARP reply are sent down from said higher layers.

30. The system according to claim 27, wherein said IP address of said source node and said IP address of said destination node are obtained from an ARP cache of said source node and said destination node, respectively.

31. The system according to claim 27, wherein an IP address of any node in said point-to-point network may be obtained from an IP header of an IP packet sent by said node.

32. The system according to claim 27, wherein an IP address of any node in said point-to-point network may be obtained from a Dynamic Host Configuration Protocol message assign said IP address to said node.

33. The system according to claim 27, wherein said ARP reply contains a link local IP address.

34. The system according to claim 33, wherein said network access point is configured to extract a MAC address of said source node from said ARP reply, replace a destination MAC address of said ARP reply with said MAC address of said source node, and unicasting said ARP reply without attaching said ARP reply to a non-ARP route reply.

35. The system according to claim 33, wherein said network access point is configured to extract a MAC address of said source node from said ARP reply, replace a destination MAC address of said ARP reply with said MAC address of said source node, and unicast said ARP reply attached to a non-ARP route reply.

36. The system according to claim 35, wherein said network access point is further configured to broadcast said ARP reply without attaching it to said non-ARP route reply after unicasting said ARP reply attached to said non-ARP route reply.

37. The system according to claim 36, wherein said ARP reply is broadcast using a data packet having a broadcast type that is the same as a broadcast type of a data packet used to broadcast said ARP request.

38. The system according to claim 26, wherein one or more nodes in said point-to-point network are configured to detect a break in a link between said one or more nodes and a neighboring node and to remove any route entries that are affected by said break.

39. The system according to claim 38, wherein said one or more nodes in said point-to-point network are further configured to define a dependent neighbors table for each route entry in said one or more nodes and send a route failure indication message to each node in said dependent neighbors table when said break is detected.

40. The system according to claim 39, wherein said nodes in said dependent neighbors table are upstream nodes that depend on said one or more nodes to provide a next hop in any route.

41. The system according to claim 26, wherein said route is to be established via both said point-to-point network and said shared medium network and via two network

access points, said network access point further configured to include a source node hop distance, which is a hop count between said source node and a network access point of said source node, in said route request, and a destination node hop distance, which is a hop count between said destination node and a network access point of said destination node, in said route reply.

42. The system according to claim 41, wherein a destination node of said route request is configured to add said source node hop distance to a hop count in said route request received from one of said network access points at said destination node, and add said destination node hop distance to a hop count in said route reply received from another one of said network access points at said source node.

43. The system according to claim 42, wherein said source node and destination node hop distances are contained in an indicator field in said route request or said route reply that also indicates a status of a node originating said route request or said route reply, or a status of said route request or said route reply itself.

44. The system according to claim 43, wherein said indicator field includes a "node status unknown" indicator, indicating that said node originating said route request or route reply has lost contact with its most recent network access point.

45. The system according to claim 43, wherein said indicator field includes a "message forwarded by network access point" indicator, said destination/source node receiving said route request/reply configured to determine whether said source/destination

node hop distance is already stored in said destination/source node, and if yes, add a source/destination node hop distance in said route request/reply to a destination/source node hop distance of said destination/source node receiving said route request/reply to obtain a hop count of said route through said shared medium network, and comparing said hop count of said route through said shared medium network with a hop count of said route through said point-to-point network.

46. The system according to claim 45, wherein upon determining that source/destination node hop distance was not already stored in said destination/source node, said destination/source node further configured determine whether a previous route entry for said originating node exists in said destination/source node, and if yes, compare a hop count in said route request/reply with a hop count of said previous route entry, and keep said previous route entry or generate a new route entry based on said comparison.

47. The system according to claim 46, wherein said new route entry is generated based on said comparison, further comprising indicating said hop count of said new route entry is possibly underestimated.

48. The system according to claim 47, wherein a route request/reply with a source/destination node hop distance is subsequently received at said destination/source node, said destination/source node configured to add said source/destination node hop distance of said subsequently received route request/reply to said possibly underestimated hop count said new route entry to obtain an updated route entry, and keep either said

updated route entry or a route entry of said subsequently received route request/reply based on a respective hop count thereof.

49. The system according to claim 26, wherein said bridging function is further configured to cause said network access point to send a dummy shared medium network data packet from one of said network access points to notify other ones of said network access points of a new node join a service area of said one of said network access points, wherein said dummy shared medium network data packet contains a MAC address of said new node as a source MAC address, and wherein said dummy shared medium network data packet is discarded by all nodes on said shared medium network except said network access points.

50. The system according to claim 49, wherein a payload of said dummy shared medium network data packet is an ARP request with all address fields set to zero.